

Simulation I/F to RTCN Thread Assessment

May 07, 1997

Version 1.1

Simulation Interface to RTCN Thread

Table of Contents

1. Introduction	3
1.1 Simulation Interface to RTCN Overview.....	3
1.2 Simulation Interface to RTCN Concept	3
1.3 Simulation Interface to RTCN Specification	3
1.4 Simulation Interface to RTCN Assessment Summary.....	4
1.5 Simulation Interface to RTCN Hardware Diagram.....	4
1.6 Simulation Interface to RTCN Deliverables	5
1.7 Simulation Interface to RTCN Schedule.....	6
1.8 Simulation Interface to RTCN Simulation Requirements	7
1.9 Simulation Interface to RTCN Training Requirements.....	7
1.10 Simulation Interface to RTCN Facilities Requirements.....	7
1.11 Simulation Interface to RTCN Procurement	7
1.12 Simulation Interface to RTCN Action Items/Resolution.....	7
2. CI Assessments	8
2.1 Simulation Gateway Assessment	8
3. COTS Products Dependencies	9
3.1 SW Products Dependency List	9
3.2 HW Products Dependency List.....	9

1. Introduction

1.1 Simulation Interface to RTCN Overview

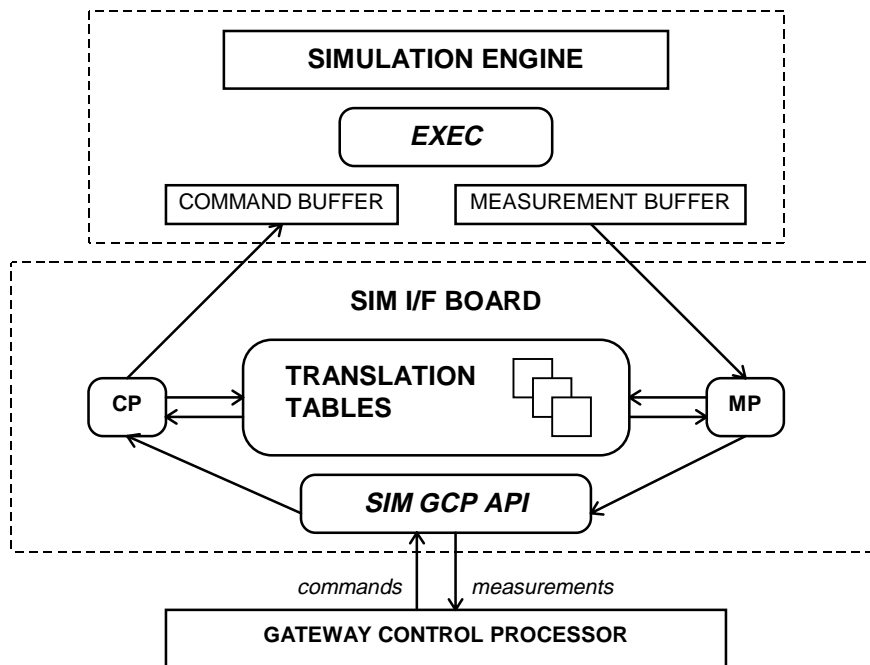
The Simulation Interface to the RTCN Thread purpose is to provide the capability to connect the SGOS Math Models to the CLCS RTCN without the use of front end gateways or VSI equipment.

1.2 Simulation Interface to RTCN Concept

The Simulation Interface to the RTCN Thread develops the initial capability to connect the SGOS Math Models to the CLCS sets. The main focus of this thread is on connectivity. The Simulation Interface to the RTCN Thread supports the following two functions:

- Provide Gateway Change Packet(s)
- Receive CCP Command Request Packet(s)

At a minimum, the system shall demonstrate the ability to issue commands to GSE Analog and Discrete stimulus. The full set of command requests will not be supported at this time.



Simulation Interface to the RTCN

1.3 Simulation Interface to RTCN Specification

The original Statement of Work is as follows:

1. Provide one each Simulation Gateways for a connection to two (2) SDEs and one (1) IDE (i.e., a total of three (3) gateways).
2. Provide a network or equivalent interface between SGOS Simulation and the Simulation Gateway.
3. Provide for the conversion of GSE, PCM, and SSME measurement values to Gateway Change Packet Formats.

4. Provide for the stimulation of the model GSE Analogs and Discrete stimulus by way of CCP Command Request Packet(s) from the RTCN

The following deltas will be made to the Statement of Work for the Redstone Delivery:

1. The Simulation I/F to RTCN will provide only the conversion of GSE measurement values to Gateway Change Packet Formats.
2. The Simulation I/F to RTCN will provide for the stimulation of only the HMF model's GSE Analog and Discrete stimuli.

1.4 Simulation Interface to RTCN Assessment Summary

The Simulation Interface to the RTCN thread depends on several CSCIs, being worked separately, to ensure success. Without the services and products provided by these threads being available when required (as reflected on the development schedule), the Simulation Interface to the RTCN cannot be successful.

- TCID Build and Control CSCI
To provide a list of FDIDs and corresponding names for the HMF model.
- Common Gateway Services CSCI
To provide APIs to communicate with the Gateway Control Processor.
- System Control CSCI
To provide the capability to load and initialize the Simulation Gateway

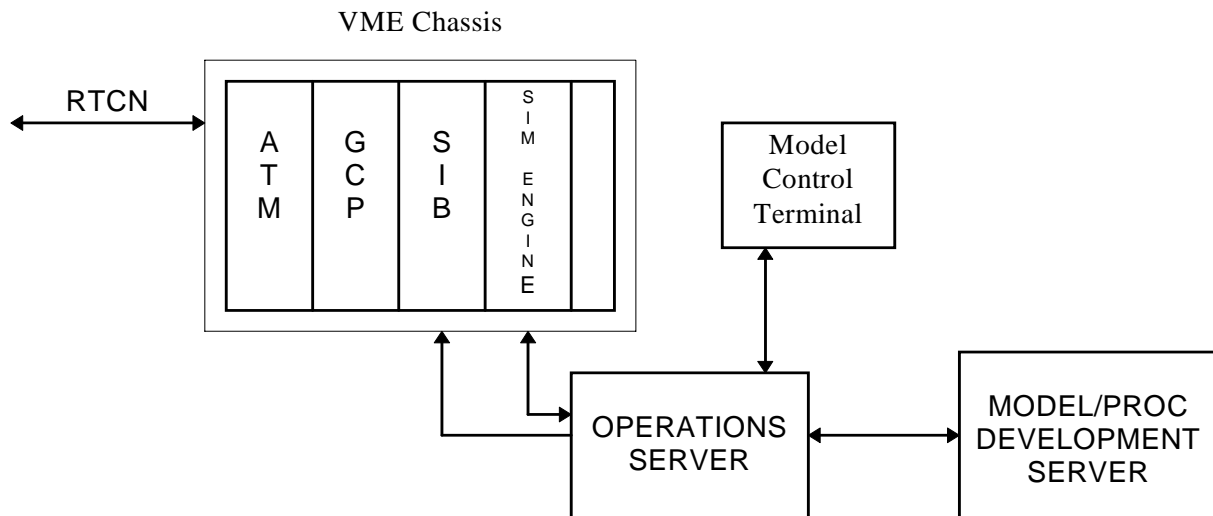
The following items summarize the areas where additional work is required to provide the Simulation Interface to RTCN Thread capabilities.

1. Develop a communication protocol between the Simulation Interface Board (SIB) and the Simulation Engine. Estimation for completion is 1.7 man-months.
2. Build translation table for mapping each CLCS FDID for the HMF model to its corresponding Data Value Storage (DVS) index. Estimation for completion is 1 man-month.
3. Develop functions to communicate with the GCP APIs to receive and process commands from the RTCN and send them to the Simulation Engine via the Communication Protocol. Estimation for completion is 1 man-month.
4. Develop functions to receive measurements from the Simulation Engine for processing and then send them to the RTCN via the GCP APIs. Estimation for completion is 1 man-month.
5. Provide the capability for loading the HMF model and Translation Tables onto the appropriate SBC (Simulation Engine, SIB). Estimation for completion is 0.5 man-months.
6. Develop Gateway emulation software for internal CSCI testing. Estimation for completion is 0.5 man-months.

1.5 Simulation Interface to RTCN Hardware Diagram

The following hardware elements must be available to support the Simulation Interface to the RTCN function:

- Enterprise Server
- Operations Server
- Simulation Interface Board (SIB) Single Board Computer (SBC)
- Simulation Engine SBC
- Gateway Control Processor (GCP)
- ATM Network Adapter Board
- VME Chassis



1.6 Simulation Interface to RTCN Deliverables

1. An SDE1, SDE2, and IDE1 Simulation Gateway each consisting of:
 - ATM Network Adapter Board
 - Gateway Control Processor (SBC)
 - Simulation Interface Board (SBC)
 - Simulation Engine (SBC)
 - VME Chassis
 - Unix Workstation (Operations Server)
2. Unix Workstation (Operations Server) for 3 gateways.
3. Simulation Gateway Software:
 - Simulation Interface Board Software
 - Simulation Engine Software
 - Graphical User Interface for Model Control
4. HMF model capable of responding to GSE analog and discrete stimuli.
5. HMF model loading capability between SGOS Simulation and Simulation Gateway
 - Network connectivity from Simulation Development Server to Operations Server for loading model
 - Capability for a remote workstation to communicate with the Operations Server for model control via telnet.
 - Network connectivity from Operations Server to 3 Simulation Gateways for loading and communicating with model on Simulation Engine and loading translation tables on SIB.
6. Simulation Gateway Documentation
 - Design Specification Document
 - Users Guide

1.7 Simulation Interface to RTCN Schedule

Design Panel 1(Concept Panel)	3/24/97 4/22/97
Develop Design Panel 1	3/24/97 4/7/97
Design Panel 1 Internal Review	4/17/97 4/17/97
Design Panel Complete	4/24/97 4/24/97
Concept Approved	4/24/97 4/24/97
Design Panel 2(Requirements Panel)	3/31/97 5/23/97
Develop Redstone CSCI Requirements	3/31/97 4/4/97
Identify Dependencies	3/31/97 4/4/97
Develop Design Panel 2	4/23/97 5/20/97
Design Panel 2 Internal Review	5/20/97 5/20/97
Design Panel Complete	5/29/97 5/29/97
Design Approved	5/29/97 5/29/97
Design Panel 3(Design Panel)	6/02/97 6/20/97
Develop Design Panel 3	6/02/97 6/12/97
Design Panel 3 Internal Review	6/13/97 6/13/97
Design Panel Complete	6/20/97 6/20/97
Code and Unit Test (UT)	3/31/97 7/18/97
Analyze Current Software	3/31/97 4/25/97
Develop Code	4/28/97 6/27/97
Preliminary CM Drop	6/30/97 6/30/97
Perform Unit Testing	6/30/97 7/17/97
Unit Test Complete	7/18/97 7/18/97
Unit Integration Testing (UIT)	7/21/97 8/1/97
Perform Integration Testing	7/21/97 7/31/97
UIT Complete	8/1/97 8/1/97
Configuration Management (CM)	
Formal CM Drop	8/19/97 8/19/97
Support CM	8/19/97 8/26/97
CSCI Integration Testing (CIT)	8/20/97 8/26/97
Perform CIT	8/20/97 8/26/97
CIT Complete	8/26/97 8/26/97
Integration Test Phase	9/1/97 9/26/97
Develop CIT Report	9/1/97 9/26/97
User Training	9/1/97 9/26/97
Support System Integration & Test	9/1/97 9/26/97
Documentation Phase	4/14/97 8/26/97
Design Specification Document	4/14/97 8/26/97
Development	4/14/97 8/15/97
Review	8/18/97 8/22/97
Update	8/25/97 8/29/97
Users Guide Document	4/14/97 8/26/97
Development	4/14/97 8/15/97
Review	8/18/97 8/22/97
Update	8/25/97 8/29/97

1.8 Simulation Interface to RTCN Simulation Requirements

N/A

1.9 Simulation Interface to RTCN Training Requirements

N/A

1.10 Simulation Interface to RTCN Facilities Requirements

Rack space and power for 3 VME systems.

1.11 Simulation Interface to RTCN Procurement

To support the Simulation Interface to the RTCN, it will be necessary to procure Single Board Computers (SBCs) and Chassis equipment for establishing the Simulation Gateway for two (2) Software Development Environments (SDEs) and one (1) Integrated Development Environment (IDE):

- 3 VME Chassis
- 3 GCP SBCs
- 3 SIB SBCs
- 3 Simulation Engine SBCs

1.12 Simulation Interface to RTCN Action Items/Resolution

- Will the HMF model used need to be validated?
- Will the Simulation Gateway need to support multiple data streams vs. single stream?
- Will the Health and Status capability need to be provided beyond Redstone?

Action Items:

Charles Filko, TCID Build and Control CSCI Lead:

Provide a list of FDIDs and corresponding FD names for the HMF model by 7/18/97.

Jim Hurst

Identify which HMF model will be used.

2. CI Assessments

2.1 Simulation Gateway Assessment

The Simulation Gateway CSCI connects the SGOS Math Models to the CLCS RTCN. The Simulation Gateway provides a means for Application Software to be checked out against a running Math Model without the use of front end gateways or a Video Simulation Interface. Initial capability for this CSCI will be to support only GSE commands and measurements for the HMF model.

In addition to Gateway Control Processor Services, the Simulation Gateway is comprised of a Simulation Interface Board (SIB) and a Simulation Engine. The SIB will provide all translation and communication functions necessary to pass commands to and receive measurements from the Simulation Engine. The Simulation Engine will be running the HMF model as it currently does under the SGOS re-platform effort.

Communication Protocol Work Required

Design and code a protocol for communication between the SIB and the Simulation Engine. Because the protocol will also be used on the VSI in the Simulation re-host effort, it will need to be compatible with the OS-9 real-time operating system.

Translation Table Build Work Required

Map each CLCS FDID for the HMF model to its corresponding Data Value Storage (DVS) index. The DVS index is the model's internal FD identifier.

Command Processor Work Required

Design and code functions which will use the GCP APIs to receive commands from the RTCN, process each command, and send them to the Simulation Engine via the Communication Protocol.

Measurement Processor Work Required

Design and code functions which will use the Communication Protocol to receive measurements from the Simulation Engine, process each measurement, and send them to the RTCN via the GCP APIs.

Gateway Emulator Work Required

Develop Gateway software emulator functions for internal CSCI testing.

Build and Load Work Required

Provide an automated facility for the HMF model and Translation tables to be built and loaded onto the appropriate SBC.

CSCI Assessment

Function Name	CSCI Labor (man-month)	% of CSCI	Function EP
Communication Protocol	1.7		
Translation Table Build	1.0		
Command Processor	1.0		
Measurement Processor	1.0		
Gateway Emulator	0.5		
Build and Load	0.5		
Total	5.7		

Lines of Code

Unknown.

Documentation

Design Specification Document
Users Guide Document

Assumptions

None.

Open Issues

- Will the HMF model used need to be validated?
- Will the Simulation Gateway need to support multiple data streams vs. single stream?
- Will the Health and Status capability need to be provided beyond Redstone?

3. COTS Products Dependencies

3.1 SW Products Dependency List

Development of the Simulation Gateway software will require VxWorks Tornado.

3.2 HW Products Dependency List

3 VME Chassis

3 ATM Network Adapter Boards

Single Board Computers:

- 3 Gateway Control Processors
- 3 Simulation Interface Boards
- 3 Simulation Engines

Operations Server

Model/Proc Development Server